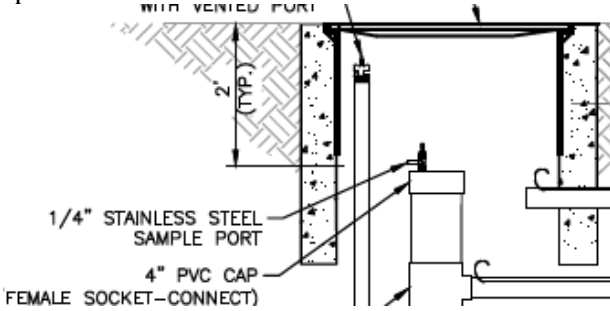
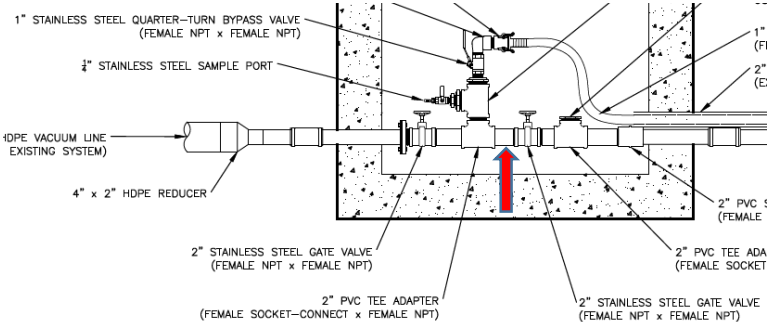


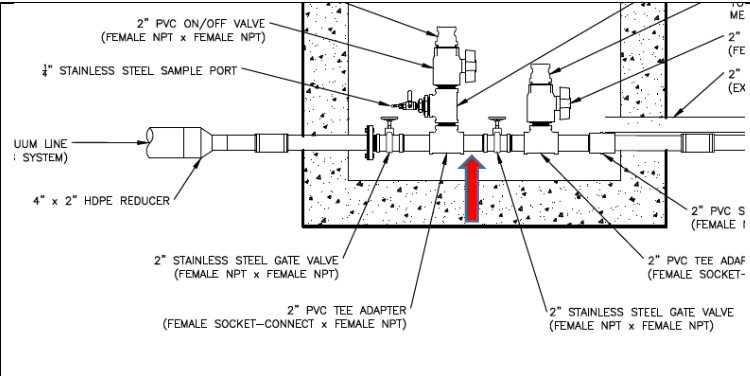
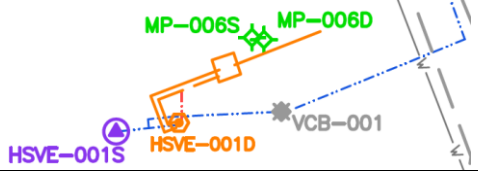
**Review Comments on
Summary of Soil Vapor Extraction System Expansion, 12/8/17
Hartford Petroleum Release Site
Hartford, Illinois
1/22/18**

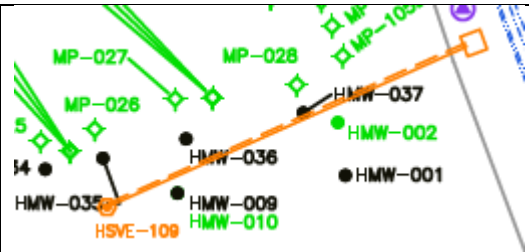
Comment Number	Page, Paragraph, Sentence	Topics of Discussion	Comments / Recommended Revisions
Introduction			
1	Page 1 Paragraph 2 Sentence 1	<p>Re: <i>“Expansion of the SVE system was conducted to enhance recovery of volatile petroleum hydrocarbons beneath the Hartford Site based on recommendations presented in the final Soil Vapor Extraction System Effectiveness Zone 6 Optimization Report (212 Environmental 2016a) and the Semiannual Soil Vapor Extraction System Operations, Maintenance, and Monitoring Report, October 2015 through March 2016 (212 Environmental 2016b).”</i></p> <p>Review comments provided for 212 Environmental 2016b included recommendations for using multiple lines of evidence to select future SVE well and other monitoring point installation locations, including but not limited to, existing soil boring logs, laser-induced fluorescence (LIF) logs, groundwater elevation data, 3-D data visualization and analysis (3DVA) results, and historical performance information from nearby SVE wells and monitoring points.</p>	Confirm what specific lines of evidence were used to select the candidate SVE well and monitoring point installation locations and screening intervals.
Well HSVE-001S Abandonment			
2	General	Not applicable.	No comments.
Extraction Well Installation			
3	General	Four SVE well/piezometer pairs (HSVE-108; HSVE-111; HSVE-112; HSVE-113) were installed in zones where hydrocarbon odors were detected; while two SVE well/piezometer pairs (HSVE-109; HSVE-110) were installed in locations where no hydrocarbon odors were detected or significant (>10 ppmv) PID readings recorded.	Clarify why the two SVE well/ piezometer pairs (HSVE-109; HSVE-110) were installed at locations where no hydrocarbon odors were detected or significant (>10 ppmv) PID readings recorded.
4	General	The report does not provide information on whether fluid (groundwater and non-aqueous phase liquid [NAPL], if present)	Confirm whether fluid levels were monitored upon installation of the 1-inch piezometers. If fluid levels were monitored, provide fluid level data.

		levels were monitored upon installation of the 1-inch piezometers.					
Multipurpose Monitoring Point Installation							
5	General	The report does not provide a rationale for the locations of new monitoring points MP-138 through MP-145.	Provide a rationale for the technical purpose of each monitoring point and a rationale for their respective locations correlated with the as-built location maps in Attachments C and D.				
6	General	Four single monitoring points (MP-138; MP-140; MP-141; MP-144) were installed in zones where hydrocarbon odors were detected; while three single monitoring points (MP-142; MP-143; MP-145) were installed in locations where no hydrocarbon odors were detected or significant (>10 ppmv) PID readings recorded.	Clarify why the three single monitoring points (MP-142; MP-143; MP-145) were installed at locations where no hydrocarbon odors were detected or significant (>10 ppmv) PID readings recorded.				
7	General	The report does not provide information regarding plans for monitoring, evaluating and reporting of monitoring points for vacuum response, total volatile petroleum hydrocarbons (TVPH), petroleum hydrocarbons (PHC), methane, carbon dioxide and oxygen to evaluate the zone of influence and effectiveness of the new SVE extraction wells.	Provide plan information for monitoring, evaluation, and reporting of SVE well performance, zone of influence and effectiveness. Provide information of how monitoring data will be used to determine the effectiveness of current monitoring point network adequacy for evaluating the total SVE system and each SVE well.				
Connection of Wells to the Vapor Collection System							
8	Miscellaneous	See Attachment D – Site-Wide As Built Documentation	See Attachment D – Site-Wide As Built Documentation				
Waste Management							
9	General	Not applicable.	No comments.				
Installation of Wellhead Completion and Stingers							
10	General	See Attachment D – Site-Wide As Built Documentation	See Attachment D – Site-Wide As Built Documentation				
Extraction Well Startup and Initial Operations Summary							
11	Page 6 Data Table	Based on the mass recovery data, eight of the nine new SVE wells do not appear to have been installed in locations with favorable mass removal conditions; i.e., high relative TVPH concentrations and higher permeability.	More comprehensive evaluation of existing site data and/or supplemental investigation is recommended to identify locations with more favorable and certain conditions for mass removal prior to future SVE well installations.				
Tables							
12	Table 1 – Routine Vapor Collection Monitoring Results	<div>There are several instances of a 0 standard cubic feet per minute (scfm) vapor flow rate, in conjunction with a high wellhead vacuum, groundwater level below the stinger, and open/non-occluded screens at the following wells and dates:<table><tr><th>Well Identification</th><th>Date</th></tr><tr><td>HSVE-001D</td><td>08/24/17</td></tr></table></div>	Well Identification	Date	HSVE-001D	08/24/17	Provide information regarding how the vapor flow measurement was conducted and an explanation of why these 0 scfm flow rate events occurred (for example, measurement error, etc.).
Well Identification	Date						
HSVE-001D	08/24/17						

		<table border="1"> <tr><td>HSVE-104</td><td>09/21/17</td></tr> <tr><td>HSVE-108</td><td>08/24/17</td></tr> <tr><td>HSVE-110</td><td>11/17/2017</td></tr> <tr><td>HSVE-110</td><td>11/24/2017</td></tr> </table>	HSVE-104	09/21/17	HSVE-108	08/24/17	HSVE-110	11/17/2017	HSVE-110	11/24/2017													
HSVE-104	09/21/17																						
HSVE-108	08/24/17																						
HSVE-110	11/17/2017																						
HSVE-110	11/24/2017																						
Attachment A – Water Well Sealing Form: HSVE-001S																							
13		Not applicable.	No comments.																				
Attachment B – Borehole and Well Completion Logs																							
14	Attachment B Borehole Logs	<p>As shown in the example below, the well completion diagrams in the Borehole and Well Completion Logs for HSVE-109 through HSVE-113 are all labeled “<i>HSVE-108</i>”.</p> <p>D WELL COMPLETION LOG HSVE-109</p> <hr/> <table border="0"> <tr> <td>017 - 5/25/2017</td> <td>NORTHING 790771.00</td> </tr> <tr> <td>t</td> <td>EASTING 2317379.07</td> </tr> <tr> <td></td> <td>COMPLETION 5/31/2017</td> </tr> <tr> <td></td> <td>SURFACE ELEVATION 430.42</td> </tr> <tr> <td></td> <td>WELL TOC 430.01</td> </tr> </table> <hr/> <table border="0"> <tr> <td>II Installation completed</td> <td>LOGGED BY T. Aseltyn</td> </tr> <tr> <td>HSVE Well</td> <td>CHECKED BY C. Martin</td> </tr> </table> <hr/> <table border="1"> <tr> <td></td> <td>USCS</td> <td>Well Diagram</td> </tr> <tr> <td>tent, OL</td> <td></td> <td> </td> </tr> </table>	017 - 5/25/2017	NORTHING 790771.00	t	EASTING 2317379.07		COMPLETION 5/31/2017		SURFACE ELEVATION 430.42		WELL TOC 430.01	II Installation completed	LOGGED BY T. Aseltyn	HSVE Well	CHECKED BY C. Martin		USCS	Well Diagram	tent, OL			Revise the Borehole and Well Completion Logs to correct the well identification number labels in the diagrams for HSVE-109 through HSVE-113.
017 - 5/25/2017	NORTHING 790771.00																						
t	EASTING 2317379.07																						
	COMPLETION 5/31/2017																						
	SURFACE ELEVATION 430.42																						
	WELL TOC 430.01																						
II Installation completed	LOGGED BY T. Aseltyn																						
HSVE Well	CHECKED BY C. Martin																						
	USCS	Well Diagram																					
tent, OL																							
14	Attachment B Borehole Logs	Re: Fluid (groundwater and NAPL, if present) level monitoring of 1-inch piezometers upon installation.	If fluid levels were monitored upon 1-inch piezometer installation, indicate measured fluid levels on the piezometer logs.																				
Attachment C – Location-Specific As-Built Documentation																							
15	Attachment D As-Built Drawings, Figure C7, Detail Area A	<p>As shown below, there is a 0.25-inch stainless steel sample port at the wellhead that is in communication with internal well space.</p>	Confirm whether this 0.25-inch stainless steel sample port will be used to measure actual wellhead vacuum (inside the well) as a true measure of vacuum applied to formation.																				

16	Attachment D As-Built Drawings, Figure C7, Detail Area B	<p>As shown below, there is a 0.25-inch stainless steel sample port at the wellhead that is in communication with internal well space.</p>  <p>1/4" STAINLESS STEEL SAMPLE PORT 4" PVC CAP FEMALE SOCKET-CONNECT</p>	Confirm whether this 0.25-inch stainless steel sample port will be used to measure actual wellhead vacuum (inside the well) as a true measure of vacuum applied to formation.
17	Attachment C As-Built Drawings, Figure C8, Detail Area A	<p>As shown below, the 0.25 stainless steel sample port located on the 2-inch PVC tee (stinger line) does not provide accurate measurements of vapor concentrations under operating conditions (i.e., under vacuum).</p>  <p>1" STAINLESS STEEL QUARTER-TURN BYPASS VALVE (FEMALE NPT x FEMALE NPT) 1/2" STAINLESS STEEL SAMPLE PORT HDPE VACUUM LINE (EXISTING SYSTEM) 4" x 2" HDPE REDUCER 2" STAINLESS STEEL GATE VALVE (FEMALE NPT x FEMALE NPT) 2" PVC TEE ADAPTER (FEMALE SOCKET-CONNECT x FEMALE NPT) 2" STAINLESS STEEL GATE VALVE (FEMALE NPT x FEMALE NPT) 2" PVC TEE ADA (FEMALE SOCKET) 2" PVC TEE (FEMALE)</p>	Recommend installing a sample port between the downstream 2-inch stainless steel gate valve and the 2-inch PVC tee (see red arrow). Suggest that the sampling tube is installed protruding through the wall into the pipe for 0.5 to 1 inch. Use high vacuum sampling pump with vacuum rating higher than operating vacuum of the system. In this manner the vapor samples could be collected while operating (under vacuum). Vapor samples collected in this manner would be more representative of the actual vapor stream conditions compared to current methodology wherein vapor samples are collected after the SVE well is shut down.
18	Attachment C As-Built Drawings, Figure C8, Detail Area B	<p>As shown below, the 0.25 stainless steel sample port located on 2-inch PVC tee (stinger line) does not provide accurate measurements of vapor concentrations under operating conditions (i.e., under vacuum).</p>	Recommend installing a sample port between the downstream 2-inch stainless steel gate valve and the 2-inch PVC tee (see red arrow). Suggest that the sampling tube is installed protruding through the wall into the pipe for 0.5 to 1 inch. Use high vacuum sampling pump with vacuum rating higher than operating vacuum of the system. In this manner the vapor samples could be collected while operating (under vacuum). Vapor samples collected in this manner would be more representative of the actual vapor stream conditions

			<p>compared to current methodology wherein vapor samples are collected after the SVE well is shut down.</p>
19	Attachment C Figure C-7, New Control Vault and Wellhead Details	<p>The report text states that a 1-inch diameter polyvinyl chloride (PVC) piezometer was co-located in the same boring with each SVE well to allow for gauging of fluid levels without having to open the operating extraction wells. The not-to-scale Section Details A and B on Figure C-7 show a notable space between the 1-inch piezometers and the SVE wells, whereas Section Detail C shows the 1-inch piezometer and SVE wells being directly adjacent.</p>	<p>Revise Figure C-7 Section Detail C to accurately depict the as-built separation distance between the 1-inch piezometer and the SVE well.</p>
Attachment D – Site-Wide As-Built Documentation			
20	Attachment D As-Built Drawings	<p>As-built drawings do not show the locations of monitoring points MP-138 to MP-145.</p>	<p>Revise the as-built drawings to show the locations of monitoring points MP-138 to MP-145.</p>
21	Attachment D As-Built Drawings , Sheet 5, Detail Area D	<p>As shown below, the 4-inch HDPE vacuum line from the HSVE-001D vault does not appear to be connected to an SVE line.</p> 	<p>Revise Sheet 5 to show the 4-inch HDPE vacuum line connection from the HSVE-001D vault to the applicable SVE line.</p>
22	Attachment D As-Built Drawings, Sheet 7, Detail Area F	<p>As shown below, the 4-inch HDPE vacuum line from the HSVE-009 vault does not appear to be connected to an SVE line.</p>	<p>Revise Sheet 7 to show the 4-inch HDPE vacuum line connection from the HSVE-009 vault to the applicable SVE line.</p>

			
Attachment E – Construction Completion Report / Geosyntec Consultants			
23	General	Not applicable.	No comments.
Attachment F – Waste Management			
24	General	Not applicable.	No comments.

NA = Not applicable